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**Preface**

This manual describes the use of the heaters as mentioned on the cover. The information in this manual is important for the correct and safe use of the heater.

**Identification of the product (fig. 1)**

The identification plate is attached to the side of the heater. The identification plate shows the following data:

A Year of production
B Serial number
C Electrical connection
D Airflow
E Capacity
F Production code

**Service and technical support**

For information about the heater, please contact your dealer or the manufacturer. Make sure you have the type and serial number of the heater.

**Guarantee and liability**

For the Guarantee and Liability see the terms and conditions.

**Environment**

The heater is made of various metals and plastics. It also contains electronic components that must go to electronic waste. Please consult your dealer for more information.

# 1 SAFETY INSTRUCTIONS

## 1.1 Pictograms in this manual

**Caution**
A caution shows a danger that can cause damage to the equipment.

**Warning**
A warning shows a hazard that can cause death or serious injury.

**Warning**
When working on the heater for maintenance or repair works always disconnect the electric power!

**Hot**
Some surfaces are hot! Wait until these parts are cooled down sufficiently before maintenance is carried out.

**Note**
Suggestions and advice for conducting the relevant tasks or activities more easily.

## 1.2 Pictograms on the heater (fig. 2)

A Hoisting instruction
B Reset button combi-thermostat

## 1.3 Pictograms on the burner (fig. 5)

A Air quantity
B Air pressure
C Yellow sticker (not applicable for user)
D Pump pressure
E Red sticker (not applicable for user)

## 1.4 Use in conformity with destination

The heater is designed for use at construction sites, showrooms, sports halls, transit sheds, workshops, preparation areas, storage areas, greenhouses, polyurethane tunnels, spray booth heating and to dry agriculture products and bulbs.

### 1.5 General instructions

**Warning**

- Read this manual carefully before you use the heater.
- Keep this document near the heater.
- Do the procedures as written.
- Do not lean on the heater.
- Do not stand closer than 2 m from the outlet of the heater.
- Make sure there is sufficient air for good combustion.
- Keep all inflammable material away from the heater.
- Only do repair and maintenance after the heater has cooled sufficiently and the heater is disconnected from the electric power.

## 2 INTRODUCTION

### 2.1 Purpose

The heaters are indirect fired heaters with photocell control and connections for room thermostat and flue with raincover.
The heaters are provided with an axial or radial air fan.
The heaters are tested at sea level at a temperature of 20°C.

### 2.2 Operation principle

The heater is provided with two electric motors. One electric motor drives a fuel pump and the fan for the burning air. The other motor drives the air fan. The pump draws the fuel from the tank. The fan blows air into and around the burner chamber. The magnetic valve opens 40 seconds after switching on the heater and the fuel flows into the nozzle.
A spark between the electrodes ignites the atomised fuel. The light from the flame activates a photocell. After the safety time the ignition switches off.
After a while the combi-thermostat switches on the motor of the main air fan and blows the warm air out of the heater.
The magnetic valve closes when you switch off the heater, or as a result of a fault, the flame stops.
The main air fan runs until a thermostat switches the fan off: the cooling cycle is complete.
It is possible to use the fan as a blower only.

The heater has a single fuel pipe system for the fuel supply. On request the system can have a twin fuel system for the fuel supply and the fuel return.

### 2.3 Main components heater (fig. 5)

A Rain cover
B Burner
C Identification plate
D Lifiting eye
E Flue connection
F Fan (axial or radial) with motor
G Heat exchanger
H Burner chamber
I Combi-thermostat with reset button
J Tigerloop
K Fuel inlet
L Fuel filter
M Push bar frame
N Switch box

### 2.4 Main components burner (fig. 6)

A Reset button burner relay
B Burner relay
C Magnetic valve
D Burner head with fan, nozzle, electrodes and swivel disk
E Photocell
F Burner motor
G Fuel pump
H Ignition transformer

### 2.5 Switch box (fig. 7)

A Main switch; 0: Off, I: On.
B Tumble switch:
CONT: Fan runs continuously,
AUT: Fan runs in the heating mode.
C Connector for room thermostat.
D Power cable (without plug)

### 2.6 Combi-thermostat (fig. 5)

The combi-thermostat (I) has three functions:

- Fan thermostat:
  The thermostat starts the main fan as soon as the heater has reached the set temperature.
  After switching off the heater, the fan keeps rotating. The fan cools the heater to avoid damage caused by overheating. The fan stops automatically.
- Burner thermostat:
  The thermostat stops the burner when the temperature of the warm air increases too much.
  When the air temperature has dropped sufficiently, the thermostat switches on the burner again.

- Maximum thermostat:
  The maximum thermostat stops the heater completely, when there is an overheating problem inside the heater.

### 2.7 Accessories

- Flue with rain cover
- Thermostat for room temperature
- Distribution head
- Soft-starter set for gradual run-in of fan
- Transformer set for electrical connections without 0
- Fresh air connection for the burner
- Hour counter
- Tube for lifting purposes

## 3 GETTING STARTED

### 3.1 Remove packaging

1. Remove the packaging from the heater.
2. Hoist the heater for transport to the place of use.

**Caution**
Hoist the heater according the instruction on the stickers.

### 3.2 Installation

1. Make sure that the heater is placed horizontally.
2. Connect the heater with the separate fuel tank, see fig. 8. Use a hose clamp.
   Diameter of the hose (A): 10 mm internal.
3. Fill the tank with fuel.

**Caution**
Use only gas oil.

**Caution**

- Gas oil tends to thicken at low temperatures. This can block the filters. Add a maximum of 15% paraffin to the fuel at temperatures below -5°C, or keep the fuel frost-proof.
- Do not place the tank in the warm air stream.

4. Make sure there is sufficient distance between the wall and the air inlet. Minimum distance is 1 m.
5. Make sure that the heated air can flow without obstruction. Minimum distance from outlet to an obstacle is 5 m.
6. Check the ventilation surface area: for each kW a surface of 25 $cm^2$ is needed.
7. Check the connection of the room thermostat.
   Do not remove the cap when you do not use a room thermostat.
   Remove the cap to connect a room thermostat.
8. Install the flue (1 m and a raincover).
9. Make sure the On/Off switch is in the 0 position.
10. Check the supply voltage: see the identification plate.
11. Fit a plug at the end of the cable.

**Caution**
Only an authorised person is allowed to put a plug at the cable.

Check the direction of rotation of the fan (for three phases motor), see “Fan rotation check”.

12. Put the plug in the socket.
13. Press the reset switch of the burner (A), see fig. 6.
14. Reset the thermostat (I), see fig. 5.

### 3.3 Fan rotation check

1. Switch the tumble switch (A) in the “CONT” position, see fig. 7.
   The fan starts rotating.
2. Feel if the fan blows air outside.

**Caution**
If the fan does not blow air outside, the stream of air does not cool the heater. The maximum thermostat will shut off the heater.

3. If the fan rotates in the wrong direction: stop the heater.
4. Disconnect the electric power.
5. Open the plug and change the two black wires.
6. Switch the tumble switch in the “AUT” position.

### 3.4 Power up

Power up for heating:

1. Open the fuel valve (B), see fig. 8.
2. Switch the rotary switch (A) in the “1” position, see fig. 7.
   The heater will produce heat after 2 minutes. This depends on the outside temperature.

**Caution**
Do not switch on the heater when there is no fuel, or when the connected fuel tank is empty.

3. Set the room thermostat.
   The heater supplies warm air after approximately 20 seconds.

Power up for blowing:
1. Switch the tumble switch (B) in the CONT- position, see fig. 7.
2. Switch the rotary switch (A) in the “1” position.
   The fan starts blowing.

## 4 OPERATION

### 4.1 During operation

**Hot**
Do not touch the flue with raincover and air outlet! The flue with raincover and the air outlet become hot during operation!

### 4.2 Power down

Power down for heating:

1. Switch the rotary switch (A) in the “0” position, see fig. 7.
   The magnetic valve closes and stops the fuel supply.

**Caution**
After you switch off the heater, the fan still rotates. The fan cools the heater to avoid damage caused by overheating. The fan stops automatically.
Do not remove the plug from the socket until the heater fully stops!

2. Disconnect the electric power.

Power down for blowing:
1. Switch the rotary switch (A) in the “0” position, see fig. 7.
2. Disconnect the electric power.

## 5 MAINTENANCE

### 5.1 Maintenance table

After each winter season, record the maintenance in the table at the back of this book.

| Description | Period | |
|---|---|---|
| | Yearly | Biennial |
| Check the pump for leakage, corrosion and filthiness. | User | |
| Check the pump, fans, ignition, photocell, burner, electrical installation and heat exchanger for general condition. | Dealer | |
| Check the fuel line for obstruction, corrosion and leakage. | User | |
| Check the fan of the burner for corrosion and filthiness. | User | |
| Check the fan for corrosion and filthiness. | User | |
| Clean the filters of the pump, magnetic valve. | Dealer | |
| Check the photocell for damage. Make sure the photocell is free from dust and sediment. | User | |
| Check the adjustment of the electrodes. | User | |
| Check the nozzle, dust etc. | | Dealer |
| Clean the fuel filter with white spirit. | User | |
| Clean the heat exchanger. | User | |
| Clean the inlet/outlet. | User | |
| Check the V-belts. | User | |

**Hot**
Do not touch the flue and air outlet!
Wait until the flue and the air are cooled down before maintenance.

## 5.2 General

**Warning**
Disconnect the electric power during maintenance!

When you store the heater for a long period:
1. Let the heater burn for 3 minutes. This protects the pump against corrosion.
2. Keep the burner head free from dust and sediment.
   A dirty burner head causes bad combustion that makes soot and carbon and damage to the burner chamber.
3. Close the valve for the fuel supply.
4. Disconnect the electric power.

## 5.3 Adjustment air inlet and electrodes (fig. 9)

A Distance nozzle-electrode
B Distance nozzle-swivel plate
C Height nozzle centre-electrode
D Distance of electrodes

## 5.4 Electrodes (fig. 10)

Check the electrodes:
1. Remove the rain cover (A) of the heater, see fig. 5.
2. Remove the cover of the burner.
3. Remove the plug of the connector (I).
4. Loosen the screws (A).
5. Remove the burner base plate (B).
6. Clean and re-adjust the electrodes (F).
   The electrodes must be free of dirt, grease, fuel etc.
   If the points of the electrodes are burned too much and adjustment is impossible: replace the electrodes.
7. Loosen the screw (D).
8. Re-adjust the electrodes.

Install the burner head in the reverse order.

Replace the electrodes:
1. Do the points 1 to 6 of “Check the electrodes”.
2. Remove the electrode cables (C).
3. Replace the electrodes.
4. Adjust the electrodes, see fig. 9.

Install the burner head in the reverse order.

## 5.5 Nozzle (fig. 10)

**Warning**
Do not touch the filter of the nozzle. This will damage the nozzle.

Check the nozzle:
1. Remove the rain cover (A) of the heater, see fig. 5.
2. Remove the cover of the burner.
3. Remove the connector (I).
4. Loosen the screws (A).
5. Remove the burner base plate (B).
6. Check the nozzle (H).
   If the nozzle is black, because of soot or coke: replace the nozzle.

Install the burner head in the reverse order.

Replace the nozzle:
1. Do the points 1 to 6 of “Check the nozzle”.
2. Remove the electrode cables (C).
3. Remove the screw (D).
4. Remove the electrodes (F).
5. Remove the screw (E).
6. Remove the swivel disc (G).
7. Replace the nozzle: use the correct type!
8. Install the swivel disc.
9. Readjust the electrodes, see fig. 9.

Install the burner head in the reverse order.

## 5.6 Photocell (fig. 11)

Check the photocell:
1. Remove the rain cover (A) of the heater, see fig. 5.
2. Remove the cover of the burner.
3. Pull the photocell (A) out of the base plate (B).
4. Clean the photocell if the glass is black.
   If the glass is cracked: the photocell must be replaced by the dealer.

Install the photocell in the reverse order.

## 5.7 Air pressure at swivel disc (fig. 12)

1. Remove the rain cover (A) of the heater, see fig. 5.
2. Remove the cover of the burner.
3. Adjust screw (A) of the air inlet according the table. Use a hexagonal key.
   Higher scale value (B): reduced pressure behind the swivel disc: upper output range.
   Lower scale value (B): increased pressure behind the swivel disc: lower performance range.
4. Replace the covers.

| Heater | Air pressure at swivel disc |
|---|---|
| IMA 61 | 3.0 ± 0.5 |
| IMA 111 | 1.0 ± 0.5 |
| IMA 185 | 3.5 ± 0.5 |

## 5.8 Air quantity at the fan of the burner (fig. 13)

1. Remove the rain cover (A) of the heater, see fig. 5.
2. Loosen the lock nut (A).

3. Adjust screw (B) of the air inlet according the table. Use a hexagonal key.
   Higher scale value: increased air volume.
   Lower scale value: reduced air volume.
4. Fasten the lock nut.
5. Replace the cover.

| Heater | Air quantity setting |
|---|---|
| IMA 61 | 3.5 ± 0.5 |
| IMA 111 | 2.0 ± 0.5 |
| IMA 185 | 3.0 ± 0.5 |

### 5.9 Replacing V-belts (fig. 14)

Only for radial fans.

1. Remove the cover (A).
2. Lower the motor (B) by using the adjusting nuts (C).
3. Remove the old V-belts (D).

| Heater | V-belt tension | |
|---|---|---|
| | Pressure | Distance |
| IMA 111<br>1.5 kW motor | 1.4 kg | 2.5 mm |
| IMA 111<br>3 kW motor | 2 kg | 7.8 mm |
| IMA 185<br>4 kW motor | 2.6 kg | 9.0 mm |

Fit new V-belts in the reverse order.

**Caution**
Tighten the V-belts according the table.

## 6 TROUBLESHOOTING

**Note**
Before you trouble shoot, make sure that the electricity is connected and the fuel tank is full.

**Warning**
Disconnect the electric power during repair!

### 6.1 Table troubleshooting

| Fault | | Cause | Solution | Action |
|---|---|---|---|---|
| The heater does not start. | 1 | The heater has no electric power. | Check the power connection. | User |
| | 2 | The burner relay is in failure: the light burns. | Push the reset button of the burner relay. | User |
| | 3 | The burner relay has a fault. | Replace the burner relay. | Dealer |
| | 4 | The thermostat setting is incorrect. | Correct the adjustment. | User |
| | 5 | The room thermostat is defective. | Replace the thermostat. | User |
| | 6 | No cap is present on the thermostat connection. | Fit the cap if a room thermostat is not used. | User |
| | 7 | The fuel pump is blocked. | Replace the fuel pump. | Dealer |
| | 8 | The maximum thermostat of the combi-thermostat stopped the heater. | Check (and correct) the airflow. Reset the heater. | User |
| | 9 | The combi-thermostat is defective. | Replace the combi-thermostat. | Dealer |
| | 10 | The fan thermostat of the combi-thermostat has an incorrect adjustment. | Correct the adjustment. See fault 9. | User |

| Fault | | Cause | Solution | Action |
|---|---|---|---|---|
| The heater does not start. | 11 | The main motor is overheated. | Check the air inlet.<br>Let the motor cool down until the reset of thermo couple.<br>See faults: 2, 3, 4, 5, 6, 8, 9. | User |
| | | | Test the motor and replace if necessary. | Dealer |
| | 12 | The capacitor of the burner motor is defective. | Replace the capacitor. | Dealer |
| | 13 | The room thermostat is in a warm air stream. | Install the room thermostat out of this warm air stream. | User |
| The burner starts, but no flame is built. | 14 | The pump coupling is defective. | Replace the pump coupling.<br>See fault 8. | Dealer |
| | 15 | The capacitor of the main motor (only for an axial fan) is defective. | Replace the capacitor. | Dealer |
| | 16 | The pump pressure is not correct, or the filter in the pump is blocked. | Adjust the pump pressure with a manometer. | Dealer |
| | 17 | The main filter is blocked. | Clean or replace the filter. | User |
| | 18 | The valve in the fuel filter is closed. | Open the valve. | User |
| | 19 | The fuel tank is empty. | Fill the tank. | User |
| | 20 | The vacuum of the fuel pump is too high. | Clean or replace the main fuel filter. | User |
| | | | Check the suction line for obstructions.<br>Check the vacuum with a vacuummeter. | Dealer |
| | 21 | The nozzle is blocked or worn. | Replace the nozzle. | User |
| | 22 | The electrodes are worn or the adjustment is incorrect. | Clean or replace the electrodes, see fig. 10. | User |
| | 23 | The magnetic valve does not open. | Check the electrical connection.<br>A “click” should be heard when you set the switch to “O” and “I”. | User |
| | | | Clean or replace the magnetic valve. | Dealer |
| | 24 | The photocell is dirty or defective. | Check and clean the window.<br>Clean the photocell.<br>Clean the swivel disc. | User |
| | | | Test the photocell and replace if necessary. | Dealer |
| | 25 | The air inlet valve of the burner has an incorrect adjustment. | Check the air inlet valve.<br>Measure $CO_2$ and soot. | Dealer |

| Fault | | Cause | Solution | Action |
|---|---|---|---|---|
| The burner starts, but no flame is built. | 26 | The adjustment of the nozzle holder and/or the swivel disc is incorrect or dirty. | Correct the adjustment of the nozzle holder and the swivel disc.<br>Clean the nozzle holder and the swivel disc. | Dealer |
| | 27 | Bad flue or bad flue connections. | Connect the heater to a correct flue system.<br>Correct the connections. | User |
| | 28 | The ignition transformer is defective. | Test the insulation in relation to the burner.<br>Replace the ignition transformer if necessary. | Dealer |
| The burner starts badly (pulsation). | 29 | The fresh air supply is not sufficient. | Open a door or a window.<br>See faults: 8, 14, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 28. | User |
| | | | Use a fresh air connection for the burner. | User |
| | 30 | The burner chamber or heat exchanger has problems. | Clean, repair or replace the burner chamber and heat exchanger, if necessary. | Dealer |
| The heater burns at short intervals. | 31 | The burner thermostat of the combi-thermostat has an incorrect adjustment. | Adjust the burner thermostat according the specifications of the manufacturer. | Dealer |
| | 32 | | See faults: 3, 12, 13, 31. | |
| The burner produces soot. | 33 | | See faults: 16, 17, 18, 19, 26, 27, 28, 30. | |
| The main fan does not start. | 34 | | See faults: 1, 8, 9, 10, 11, 15. | |
| The burner starts, the flame is built, but the burner stops. | 35 | The burner relay has a failure. | See faults: 3, 17, 21, 25, 29. | |
| The heater cannot be stopped. | 36 | | See faults: 3, 23. | |
| The heater stops completely. | 37 | There is an overheating problem inside the heater. | Reset the maximum thermostat. | User |
| | | | Reset the burner, see fig. 6(A). | User |
| The heater stops burning. The reset button is lit. | 38 | The suction line or main filter has an air leak. | Check and replace if necessary. | User |
| | 39 | The protection grill for the air intake is dirty or blocked. | Clean the grill. | User |
| | 40 | The heat exchanger is clogged. | Clean the heat exchanger. | User |
| The heater produces white smoke. | 41 | The fuel system has air. | Check the fuel system. | User |

| Fault | | Cause | Solution | Action |
|---|---|---|---|---|
| The heater uses too much fuel. | 42 | The nozzle is too big or the wrong type is used. | Replace the nozzle with the correct one. | User |
| | | | Check the fuel pipes. | User |

Record the maintenance details in table A in the appendix at the back of this book.

## 7 SPARE PARTS

For operation we advise you to have spare parts in store, see table B in the appendix at the back of this book.

## 8 TECHNICAL INFORMATION

- For the technical specifications, see table C in the appendix at the back of this book.
- For the electrical diagram, see diagram D in the appendix at the back of this book.

### 8.1 Explanation of the electrical diagrams

| Pos. | Description |
|---|---|
| BR | Burner |
| C | Capacitor |
| HC | Hour counter (option) |
| HR | Auxiliary relay |
| M | Fan motor |
| RT | Room thermostat (option) |
| S-BR | Switch burner |
| S-M | Switch fan motor |
| SK | Switch box |
| STB | Maximum thermostat |
| TR | Fan thermostat |
| TW | Burner thermostat |

### 8.2 Explanation of the colors of the electrical wiring

| | |
|---|---|
| RD | Red |
| OE | Orange |
| BN | Brown |
| YW | Yellow |
| BK | Black |
| BU | Blue |
| GY | Grey |
| WE | White |

## 9 INSTALLATION OF ACCESSORIES

### 9.1 Flue (fig. 4)

The heater is provided with a flue connection.

1. Fit a flue (B) to the flue connection (C).

**Caution**
The flue must point upwards. Never place the flue horizontal. An angle of 45° is acceptable; minimum length flue 1000 mm.

2. Fit a rain cover (A) to the end of the flue.

### 9.2 Diameter of the flue connection

| IMA 61 | IMA 111 | IMA 185 |
|---|---|---|
| 180 mm | 200 mm | 200 mm |

### 9.3 Outlet hose

An outlet hose must be fitted to the outlet of the heater, in order to blow heated air to a remote area away from the heater.

**Caution**
Check the temperature resistance of the used hose.

Please contact the dealer for information about maximum lengths of outlet hoses, bends, distribution pipes and hose clamps.

### 9.4 Diameters of outlet hoses

| Number of outlets | IMA 61 | IMA 111 | IMA 185 |
|---|---|---|---|
| | mm | mm | mm |
| 1 | ∅ 400 | ∅ 500 | ∅ 600 |
| 2 | ∅ 300 | ∅ 365 | ∅ 500 |
| 3 | - | - | ∅ 365 |
| 4 | - | ∅ 300 | ∅ 300 |

| Back pressure of fan | IMA 61 | IMA 111 | IMA 185 |
|---|---|---|---|
| | Pa | Pa | Pa |
| Axial | 150 | 150 | 150 |
| Radial | 250 | 500 | 500 |

### 9.5 Room thermostat

See the instructions of the room thermostat.